

Solving Systems of Equations Using Inverse Matrices

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Ex 1: Use matrix multiplication to multiply the matrices in the equation below.

$$\begin{bmatrix} 2 & -1 \\ -3 & 4 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -10 \\ 5 \end{bmatrix}$$

Ex 2:

Working backward from step 1, we can write a system of equations as a matrix equation.

$$\begin{aligned} 2x - y &= -10 \\ -3x + 4y &= 5 \end{aligned}$$

$$\begin{bmatrix} & \\ & \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \\ \end{bmatrix}$$

Ex 3: Now we can solve the matrix equation using an inverse matrix!

$$\begin{bmatrix} 2 & -1 \\ -3 & 4 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -10 \\ 5 \end{bmatrix}$$

Multiply both sides of the equation by the inverse of the 2x2 matrix:

so ... $x = \underline{\hspace{2cm}}$ and $y = \underline{\hspace{2cm}}$!
or (,)

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Here are some for you to try ...

Ex 4: Solve the system of equations using an inverse matrix.

$$2x + 5y = 19$$

$$3x + 2y = 1$$

Ex 5: Solve the system of equations using an inverse matrix.

$$5x + 7y = 9$$

$$y = -\frac{2}{3}x + 1$$